HEURISTIC EVALUATION

The Computers & Technology, Collection Page, on the Internet Archive

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EXECUTIVE SUMMARY

This report provides a comprehensive analysis of the Computer & Technology, Collection Page, on the Internet Archive for Desktop. We performed various interactions with the webpage such as searching, navigating, and utilizing various options. During our interactions we sought out pre-existing webpage issues with the use of Jakob Nielsen's Usability Heuristics for User Interface Design. Heuristics Evaluation is a process that allows us to utilize a standard framework to measure the usability and functionality of a website.

Our team consisted of two members who performed their evaluations separately to avoid any confirmation biases. After identifying issues that failed to comply with Nielsen's Usability Heuristics, each team member detailed the action flow, the issue, severity, the heuristic violated, an explanation, and recommendations to resolve the issue.

A total of 13 issues were identified. The most common were recognition rather than recall issues (3 total), and aesthetic minimalist design issues (5 total). Other heuristic violations include match system and real-world; help users recognize, diagnose, and recover from errors; visibility of system status; consistency and standards, and flexibility and efficiency of use.

Findings and Recommendation

Findings 1: Conflicting search boxes are found on the collection page.
Recommendation: A longer search bar positioned right above the thumbnail collections, with proper labels, would ensure users utilize the correct search bar.

Findings 2: The terminology used under the search bar is technical.
Recommendation: We suggested adding an exposed drop-down menu under the search bar including the word "Everything", "Title", and "Author".

Findings 3: Correcting errors is missing in the search function**.**
Recommendation: We suggested adding a feature to recognize the typo and inform a user by using an error message.

Findings 4: Infinite Scrolling on the result page is overwhelming.
Recommendation: We suggested adding a message "You've viewed 50 of 200 results" to keep the users informed on how many results are left. Also, the users can control the amount of content each time.

Findings 5: Lack of file management in My Favorite.
Recommendation: We suggested adding the feature which allows users to organize media in a folder.

Findings 6: Two horizontal navigation bars are confusing.
Recommendation: We suggested adding a fat footer at the bottom of the page to replace the secondary menu.

Findings 7: Two search boxes are found inside the horizontal navigation bar.
Recommendation: We suggested removing the search bars and adding another column inside the drop-down menu for “Wayback machine”. “Save page” and “Search archived page” are categorized inside the group.

Findings 8: Changing logos are found on the top of the collection page.
Recommendation: We recommend removing the rotating logos and placing a simple icon that represents video, computers, and technology.

Findings 9: Unnecessary Link
Recommendation: We recommend removing the link to eliminate any unnecessary links that may distract users.

Findings 10: Options on the top of the page are not clear
Recommendation: The functions need to be redone so that all options are working properly, especially the “Play All” feature.

Findings 11: Sort By filters are not fully customizable
Recommendation: We recommend giving the users the option to filter dates in both ascending and descending order.

Findings 12: Selected Options are not visible in the tableau
Recommendation: We recommend making the selection more visible by highlighting the parent link or using a text color that provides more contrast from the rest of the options.

Findings 13: Inconsistent modular grid system
Recommendation: We highly recommend filling each modular grid with the entire logo or brand, or at least two-thirds, to create a square. Additionally, we recommend that each grid is consistent in size and lined up perfectly.

INTRODUCTION

The Internet Archive (www.archive.org) is a nonprofit digital library. It was founded on May 10, 1996, in San Francisco, California, by Brewster Kahle. The Internet Archive houses billions of web pages, books, images, videos, audio recordings, software programs, and other cultural artifacts in digital form. Users can upload media to the Internet Archive. The Internet Archive also partners with thousands of global foundations to help preserve their work. Their mission state is to provide free “universal access to all knowledge.” They pay special attention to books in which they’ve currently archived over 38 million books and texts. Another one of their missions is to assist those who have difficulty with physical books. Many digital books are available to people with print disabilities. The Internet Archive houses 7 million videos, 2 million of which are Television News Programs. In our assessment, the goal is to investigate the following questions to improve the usability of the Internet Archive.

- With more than 1 million people using the Internet Archive every day, how can we improve their user experience?
- How do we help the growth of the Internet Archive?
- How do we ensure that first-time users of the Internet Archive return?

METHODS

Scope of Evaluation:

Our focus was on a specific section of the Internet Archive website called Computers & Technology, Collection Page. Some sub-sections included the “Favorites” page, search results page, and various “Collections.” We determined the following action flows to manage the whole process.

1. Find a video about “Hacker”
2. Mark two videos as “My Favorite”, and add them to your profile
3. Navigate the design of the pages

HEURISTICS USED

We utilized Jakob Nielsen’s Heuristics. There are ten commonly used usability heuristics for user interface design. These principles include the following:

1. **Visibility of System Status**
   A system in which a user is always informed about what is happening.

2. **Match Between System and the Real World**
   An intuitive system where information appears natural. Terms, concepts, icons, and images are easy to understand.

3. **User Control and Freedom**
   Users have the freedom to Undo and/or Redo their interactions.

4. **Consistency and Standards**
   A system that maintains consistency and follows established industry conventions to reduce cognitive load and having to learn something new.

5. **Error Prevention**
   A well-thought-out design that prevents slips and mistakes with constraints and good defaults.

6. **Recognition Rather Than Recall**
   A good interface with easily recognizable objects, actions, and visible. A reduction in memory load where users don’t have to recall information.

7. **Flexibility and Efficiency of Use**
   The ability for users to speed up or simplify their interactions through shortcuts, personalization, or customizations.

8. **Aesthetic and Minimalist Design**
   The content and visual design are focused on the essentials. Good organization and prioritization without unnecessary elements that may distract users from important information.

9. **Help Users Recognize, Diagnose, and Recover from Errors**
   Users are informed when things go wrong in plain language that they will understand. Allows users to recover from errors easily.

10. **Help and Documentation**
    A help system that users can easily find and access. If additional actions are needed, users must be able to easily understand and carry out these actions.

SEVERITY RATING SCALE

We adopted the Severity Rating Scale developed by Nielsen (1994) for usability problems to reduce large discrepancies among the evaluators and make it more objective. (Severity Ratings for Usability Problems: Article by Jakob Nielsen, n.d.)

0 = I don't agree that this is a usability problem at all
1 = Cosmetic problem only – need not be fixed unless extra time is available on project
2 = Minor usability problem – fixing this should be given low priority
3 = Major usability problem – important to fix, so should be given high priority
4 = Usability catastrophe – imperative to fix this before product can be released

GROUP DEBRIEF AND CONSOLIDATION OF RESULTS

Each team member performed their heuristic evaluations separately to avoid group confirmation bias. We also identified any issues that failed to comply with Nielsen's Usability Heuristics. After the members completed the evaluation, we created a table to summarize all the usability issues and included screenshots to illustrate the errors clearly. Each of us also explained the issues to ensure the members could fully understand the difficulties they encountered.

After consolidating a list of issues, our team removed all those duplicates and combined similar issues. During the discussion, we also reassessed the errors one by one to determine whether the heuristics were able to match the respective issues. For those we could not reach an agreement, we decided to highlight them in red to indicate partial agreements. We give each Heuristic Evaluation recommendation to improve the usability of the web page. Eventually, 13 items were considered significantly important to the Internet Archive.

FINDINGS AND RECOMMENDATIONS

Summary of Results:

We identified some errors that violated Nielsen's 10 usability principles. Based on the result of our study, we delineated and categorized the results into three sub-sections according to different action flows. We also explained a thorough analysis and suggestions about the following errors found in the sites.

Action Flow #1

Find a video about "Hacker"

Finding #1

Issues: Conflicting search boxes are found on the collection page.
Severity: 3/4
Heuristic Violated: 6 - Recognition rather than recall

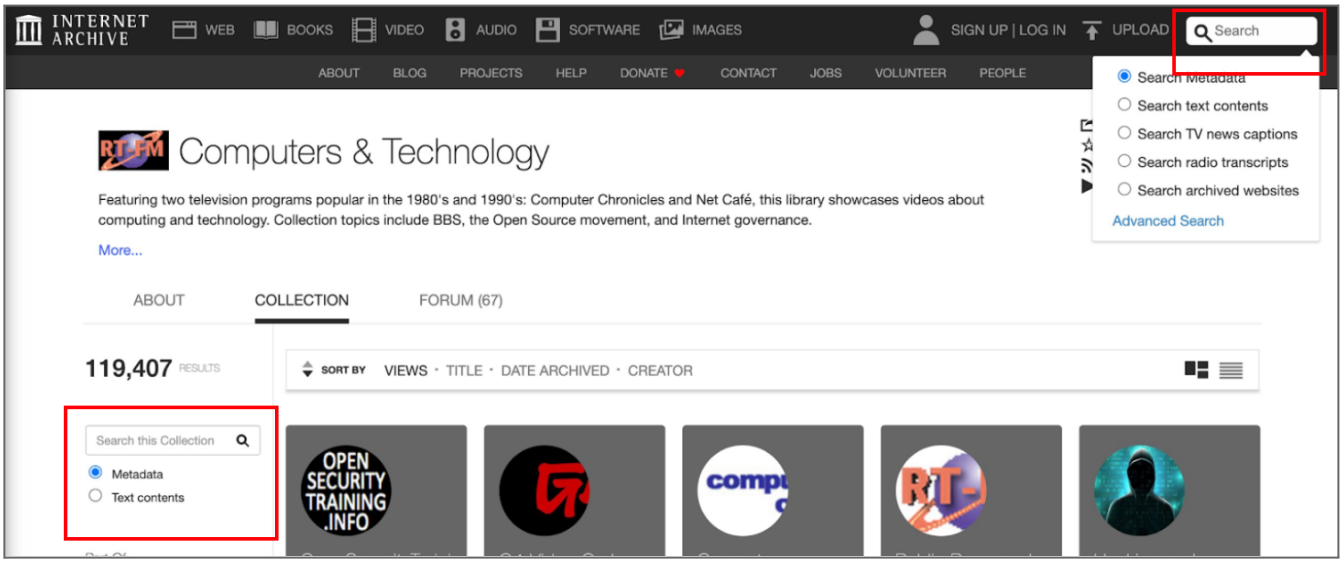

Figure 1.1: Two search bars are found on the same page

Explanation:

There are two search boxes on the webpage—one on the top right and the other on the far-left column. The top right search box searches the entire site, whereas the left searches the video collections. These two search boxes can conflict with each other and violates the Recognition Rather Than Recall heuristic. Naturally, we were inclined to utilize the top right search box to search the page we were on.

Recommendation:

A longer search bar positioned right above the thumbnail collections, with proper labels, would ensure users utilize the correct search bar.

Finding #2

Issue: The terminology used under the search bar is technical.

Severity: 4/4

Heuristic Violated: 2 - Match system and the real world

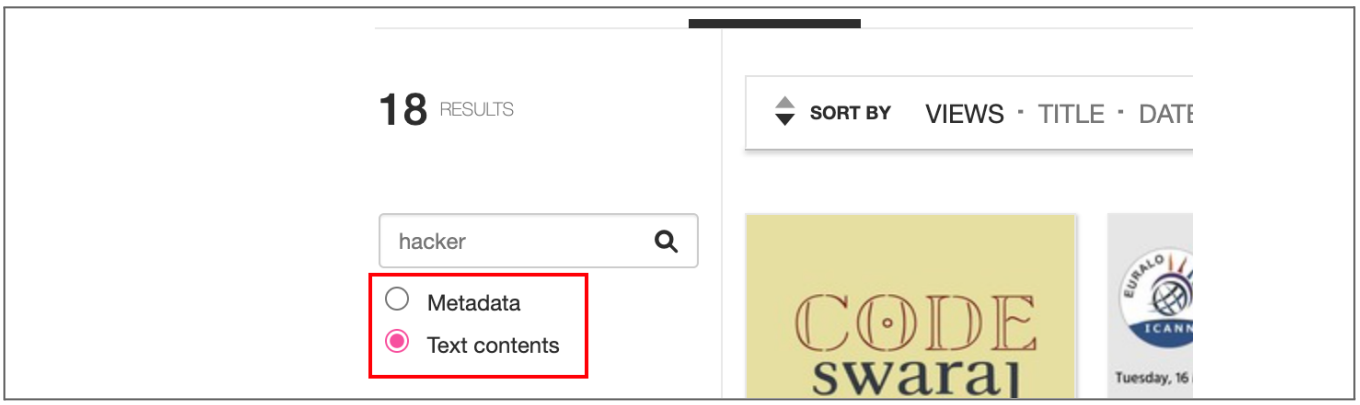

Figure 2.1: Two confusing options under the search sidebar

Explanation:

The word “Metadata” and “Text contents” are overly technical which might affect the readability of the search function. Due to the diverse demographic background of the end user on this webpage, they might have some difficulty understanding the actual meaning of this option.

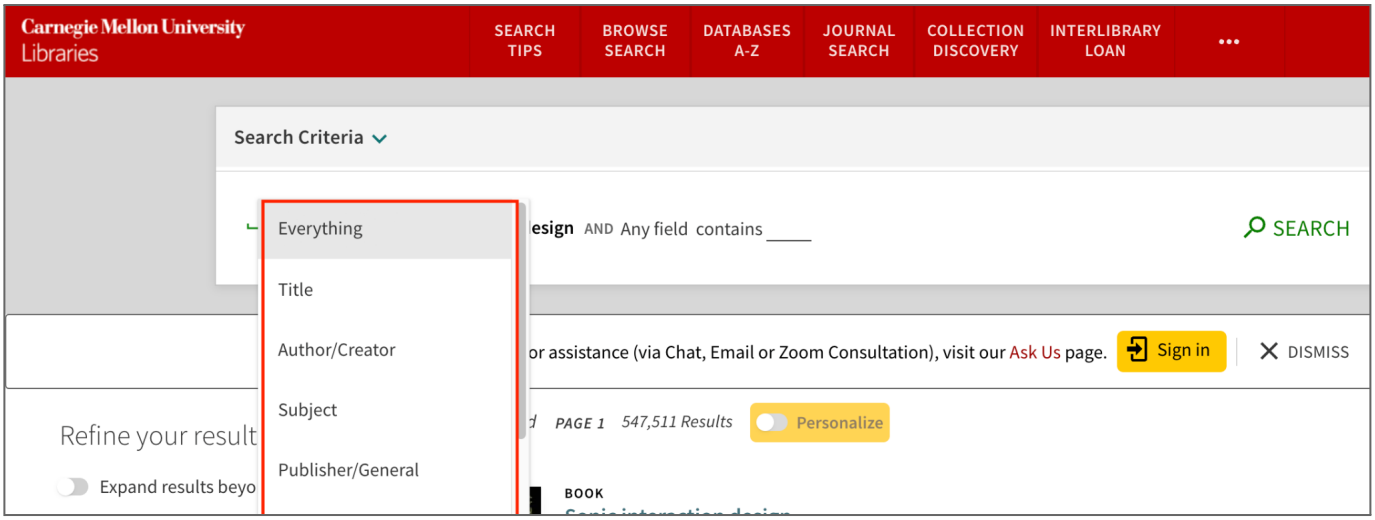

Figure 2.2: A search bar captured from an online library of Carnegie Mellon University

Recommendation:

We suggested adding an exposed drop-down menu under the search bar. Compared to the usual one, an exposed menu can display currently selected menu items. We can include “Everything”, “Title”, and “Author” which are clear and relatable for users to understand their meaning without looking up a word’s definition in a search engine. It can reduce confusion and save time on learning how to use our search function.

Finding #3

Issue: Correcting errors is missing in the search function
Severity: 3/4
Heuristic Violated: 9 - Help users recognize, diagnose, and recover from errors

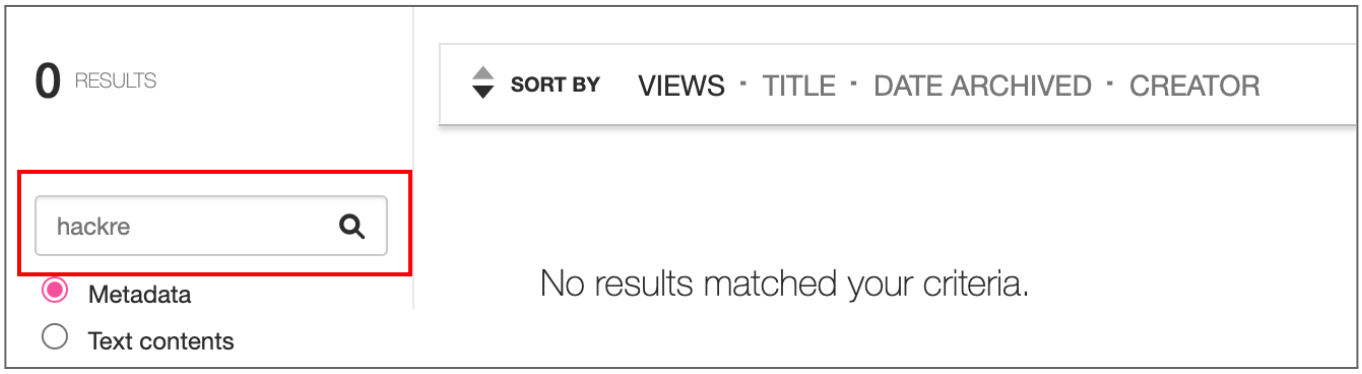

Figure 3.1: Searching for a wrong keyword "hackre" on Internet Archive

Explanation:

Google Search On 2020 had revealed that "one search query in ten contains spelling errors" (SEO & Web marketing suite, 2021) and this represented misspelling is a common mistake made by users. Slip-of-finger errors are also classified as classic print errors, the users know how to spell the terms but type them incorrectly due to distraction. Internet Archive does not include this function.

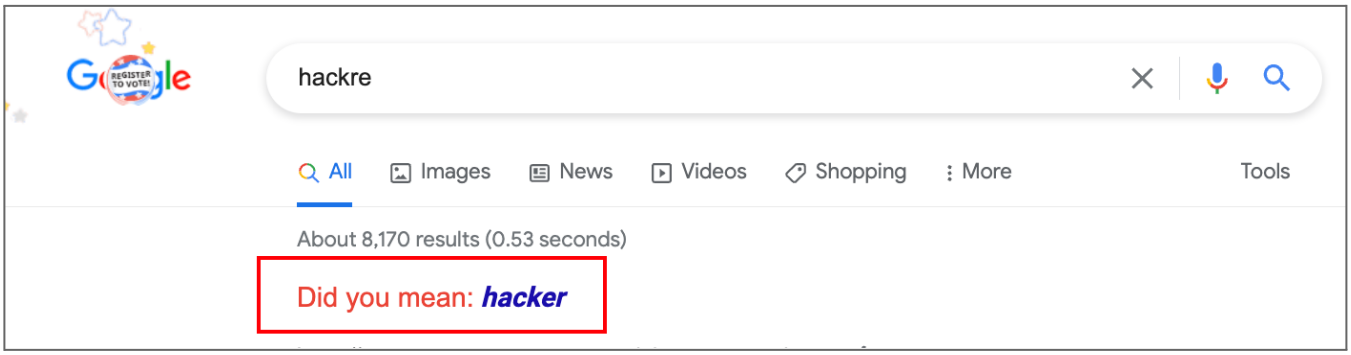

Figure 3.2: Searching for a wrong keyword "hackre" on Google

Recommendation:

Adopting error correction to ensure the users overcome any errors within the system. We suggested adding a feature to recognize the typo and inform a user by using an error message. For instance, Google reminded the user, "Did you mean: *hacker*?", a good demonstration of mixing red and blue colors to accommodate color-blind users. The error message should speak the simple language in a gentle manner to make sure not to frustrate the users. (Vela, 2022) Last but not least, a system is required to fix the problem and provide a solution to the users. Google search engine allows us to simply click on the message and it brings us an accurate result page.

Finding #4

Issue: Infinite Scrolling on the result page is overwhelming.
Severity: 3/4
Heuristic Violated: 1 - Visibility of System Status

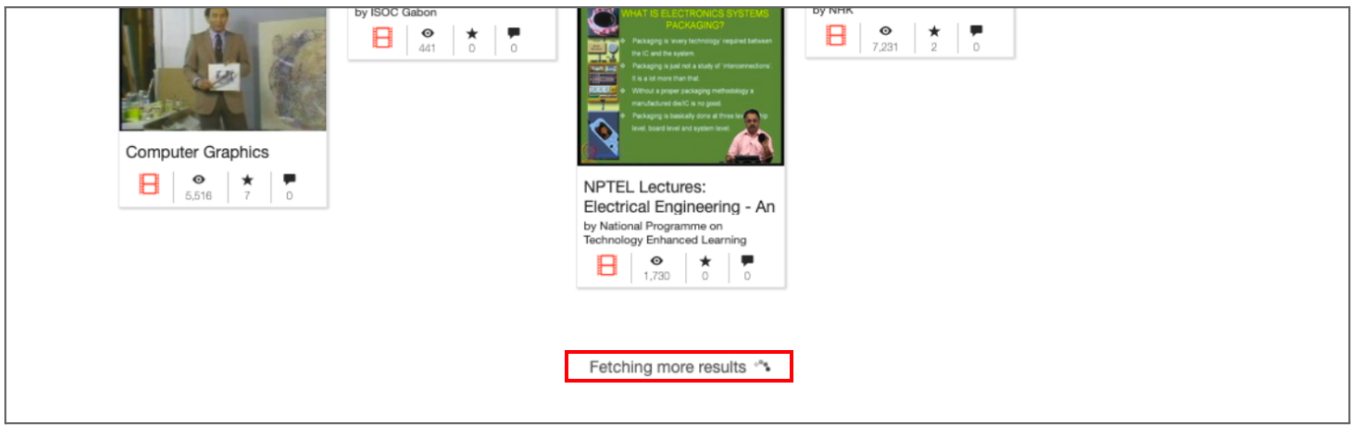

Figure 4.1: "Fetching more results" on the collection page

Explanation:
When you scroll down on the result page of Internet Archive, it automatically loads the content continuously. However, users may lose orientation during navigation. It might be hard for users to allocate any specific items. The users also do not know the current status of this design.

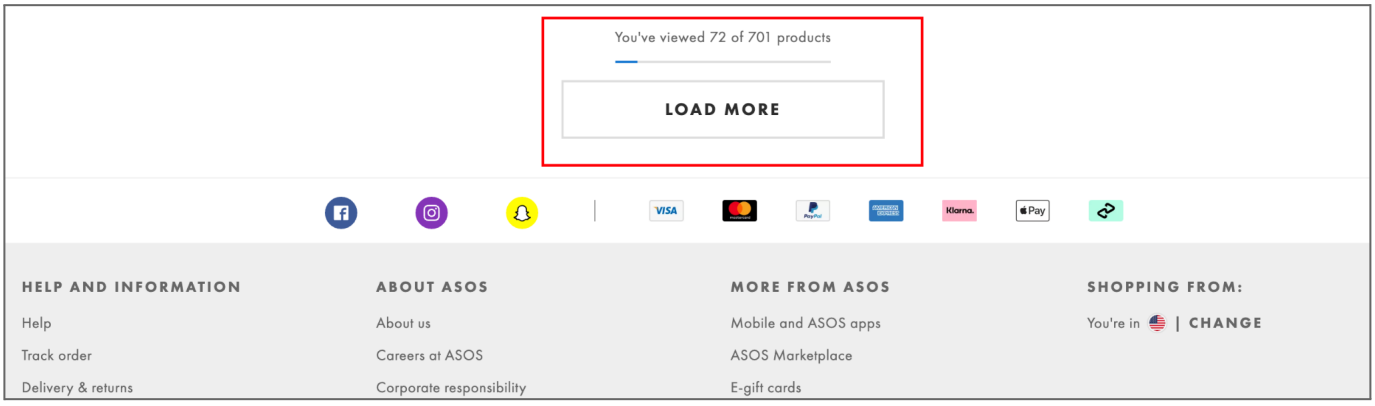

Figure 4.1: "Load more" on the listing page of ASOS

Suggestion:
We suggested adding a message "You've viewed 50 of 200 results" to keep the users informed on how many results are left. Also, the users can control the amount of content each time.

Action Flow #2

Mark two videos as "My Favorite", and add them to your profile

Finding #5

Issue: Lack of file management in My Favorite.
Severity: 4/4
Heuristic Violated: 8 - Aesthetic and minimalist design

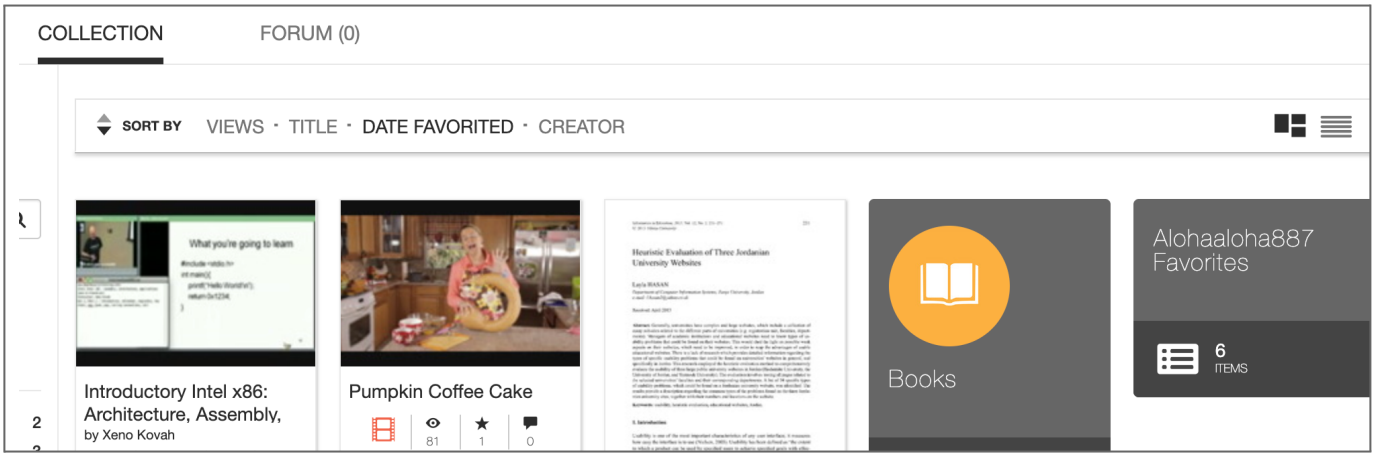

Figure 5.1: "My favorite" in my profile page on Internet Archive

Explanation:

The Internet Archive mainly provided an online database that allows them to download the media. It might take a longer time to search for what they are looking for when they have 20+ favorite media. A cluttered layout without visual order might increase the cognitive load of the users.

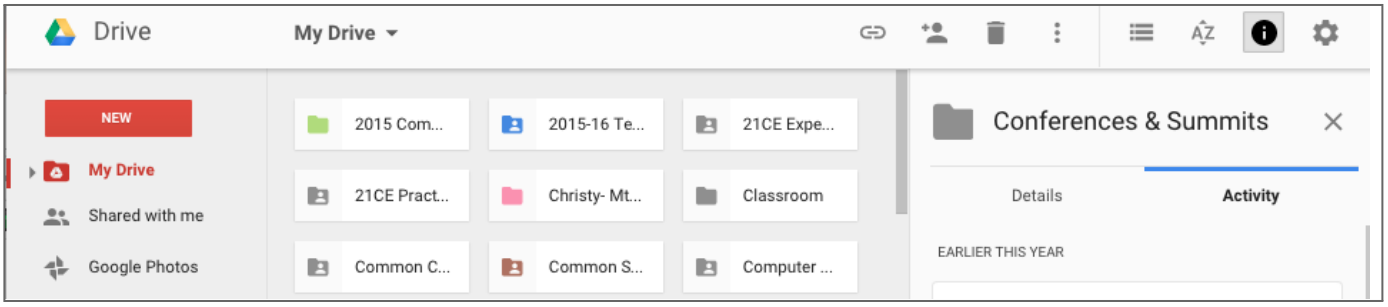

Figure 5.2: Folder organization on Google Drive

Suggestion:

We suggested adding the feature which allows users to organize media in a folder. With a clear directory, this efficient structure can make users easier to access and manage the media. It can raise the productivity of end-user. Disorganization might lead to frustration and stress when they have a tight schedule.

Action Flow #3

Navigate the design of the page

Finding #6

Issue: Two horizontal navigation bars are confusing.

Severity: 4/4

Heuristic Violated: 8 - Aesthetic and minimalist design

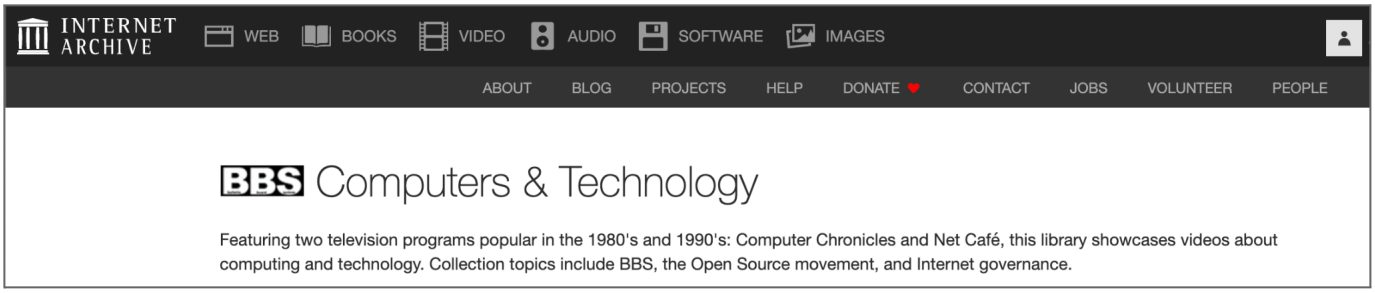

Figure 6.1: Double menus are found on top of the collection page

Explanation:

Two navigation bars provide too many options for users and these are confusing and overwhelming to users. The user might find it difficult to choose the first sight. It violated the rule of aesthetic and minimalist design as the secondary menu is considered visual clutter, which is known as “noise”.

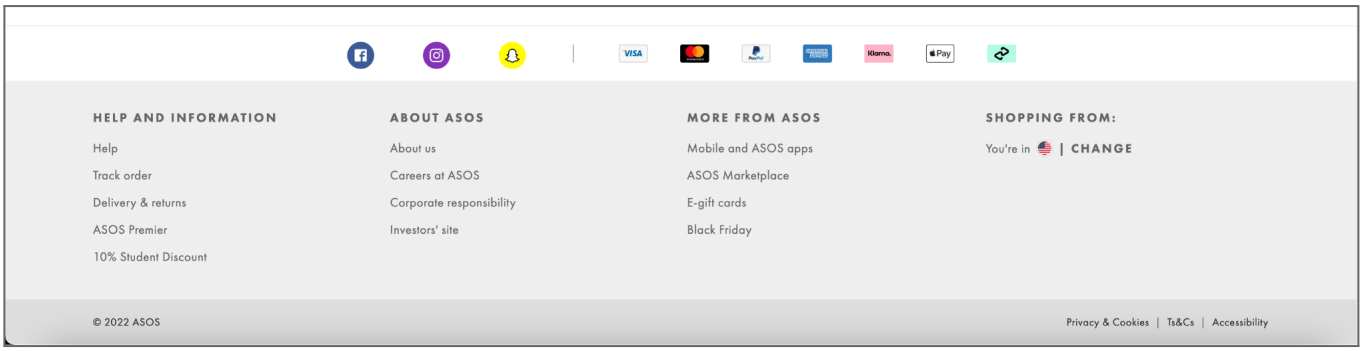

Figure 6.2: A Fat Footer of ASOS

Suggestion:

We suggested adding a fat footer at the bottom of the page to replace the secondary menu. A fat footer can act as a UX safety net. If the users scroll through your entire homepage and are still not able to find what they are searching for, the footer can be the last opportunity to capture the users’ attention. The upper menu can be used as the fundamental purpose that caters to all users’ needs. Meanwhile, the footer can keep the whole website balance and reduce the noise.

Finding #7

Issue: Two search boxes are found inside the horizontal navigation bar.

Severity: 4/4

Heuristic Violated: 8 - Aesthetic and minimalist design

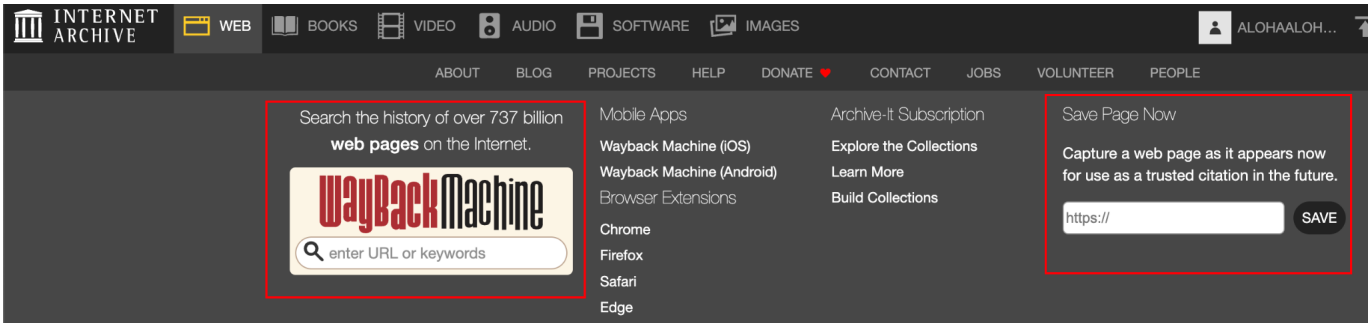

Figure 7.1: Two search boxes are found from the drop-down menu inside the navigation bar.

Explanation:

The right search box searches archived and the left helps to save the active webpage. Including the search box in the sidebar, there are three in total. The webpage is overcrowded with options and this might block users from finding the important things during their quick scan.

Suggestion:

We suggested removing the search bars and adding another column inside the drop-down menu for “Wayback machine”. “Save page” and “Search archived page” are categorized inside the group. This can avoid distraction and create a good impression on users.

Finding #8

Issue: Changing logos are found on the top of the collection page.

Severity: 3/4

Heuristic Violated: 8 - Aesthetic and minimalist design

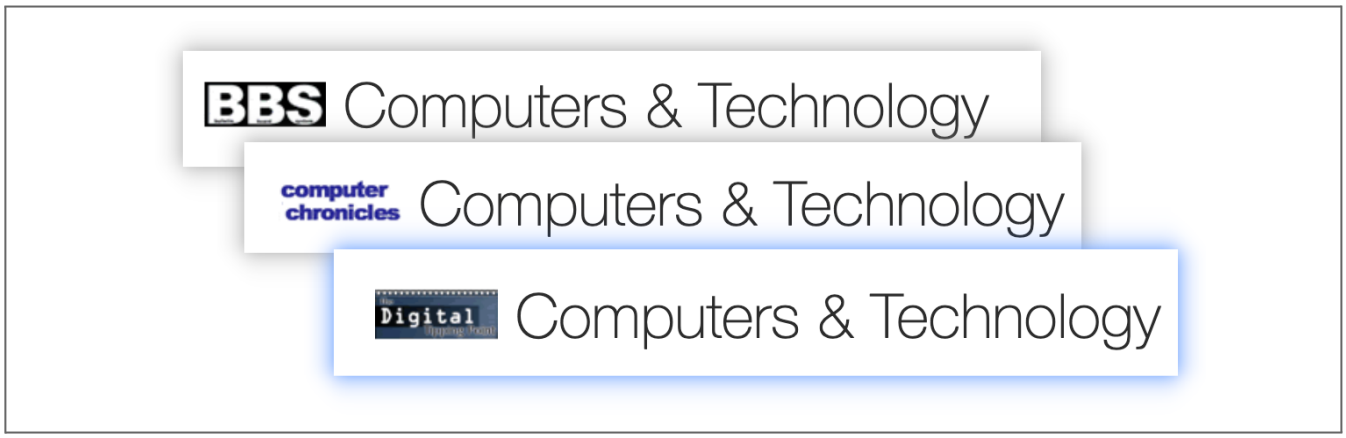

Figure 8.1: Changing logos on the collection page

Explanation:

The rotating logos next to the Computers & Technology title is an unnecessary element that may distract users. This violates the Aesthetic and Minimalist Design heuristic. It gives noise that is irrelevant to information in the interface.

Digital Computers & Technology
Featuring two television programs popular in the 1980's and 1990's: Computer Chronicles and Net Café, this library showcases videos about computing and technology. Collection topics include BBS, the Open Source movement, and Internet governance.
More...

Figure 8.2: Fixed icon on the collection page

Recommendation:

We recommend removing the rotating logos and placing a simple icon that represents video, computers, and technology. If the goal is to highlight certain programs and collections, we recommend pinning those collections (thumbnails) on the first row of the modular grid system. We aimed to maintain a high signal-to-noise ratio to make the interface clear.

Finding #9

Issue: Unnecessary Link
Severity: 2/4
Heuristic Violated: 4 - Consistency and standards

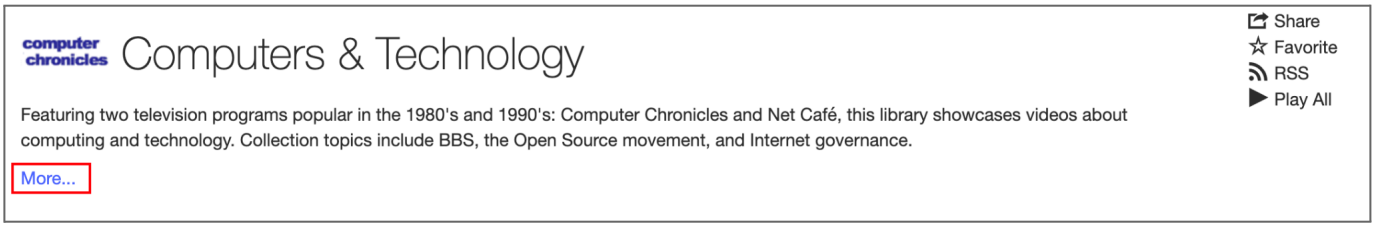
computer chronicles
Computers & Technology
Share
Favorite
RSS
Play All
Featuring two television programs popular in the 1980's and 1990's: Computer Chronicles and Net Café, this library showcases videos about computing and technology. Collection topics include BBS, the Open Source movement, and Internet governance.
More...

Figure 9.1: "More" Function on the top of the collection page

Explanation:

The "More" link sends users to the "About" section. Upon clicking this link, we were expecting the additional text to display, however it sends us to another page which is a bit redundant because the "About" link is located just below it. It violates consistency and standards as well as the aesthetic and minimalist design because it is an unnecessary element that can be distracting.

Recommendation:

We recommend removing the link to eliminate any unnecessary links that may distract users.

Finding #10

Issue: Options on the top of the page are not clear
Severity: 4/4
Heuristic Violated: 6 - Recognition rather than recall

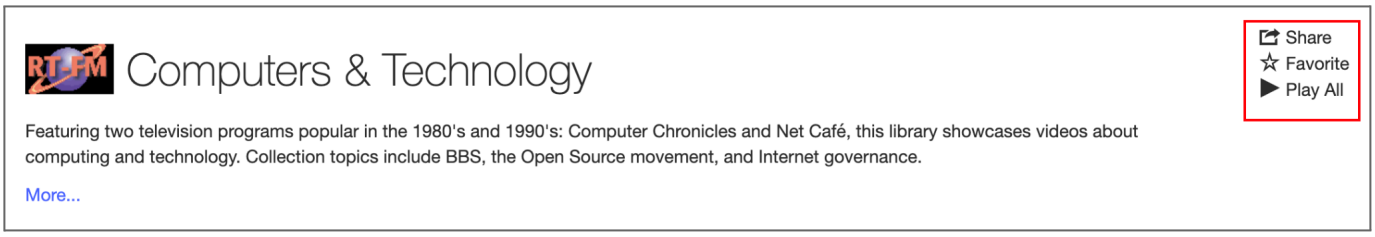
RT-FM
Computers & Technology
Share
Favorite
Play All
Featuring two television programs popular in the 1980's and 1990's: Computer Chronicles and Net Café, this library showcases videos about computing and technology. Collection topics include BBS, the Open Source movement, and Internet governance.
More...

Figure 10.1: The logos in the upper right corner of the page

Explanation:

Some of the options in the upper right corner labeled Share, Favorite, and Play All, are not clear on what they do. After reviewing each link, they are important functions that should be more prevalent to the user. This violates the recognition rather than recall heuristics as this information should easily be recognizable to the user. Additionally, the "Play All" link does not appear to do anything.

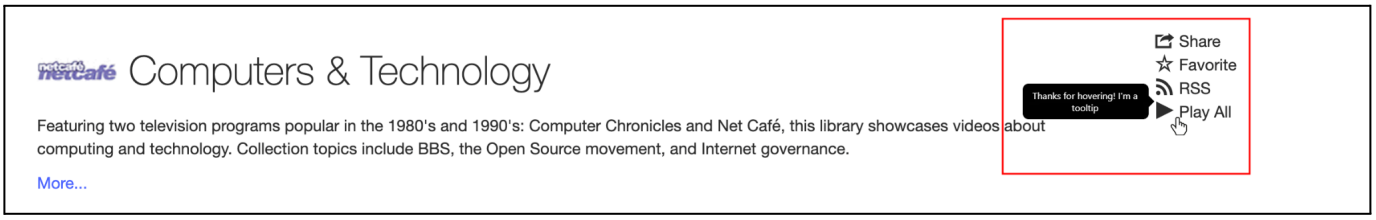
Computers & Technology
Featuring two television programs popular in the 1980's and 1990's: Computer Chronicles and Net Café, this library showcases videos about computing and technology. Collection topics include BBS, the Open Source movement, and Internet governance.
More...
Share
Favorite
RSS
Play All
Thanks for hovering! I'm a tooltip

Figure 10.2: Example of tooltip

Recommendation:
While we feel that these links are good accelerators and obey the flexibility and efficiency of use heuristic, the functions need to be redone so that all options are working properly, especially the "Play All" feature. Additionally, the options can be more intuitive by adding tooltips when users hover over the link, with descriptions of what each option does.

Finding #11:

Issue:	Sort By filters are not fully customizable
Severity:	3/4
Heuristic Violated:	7 - Flexibility and efficiency of use

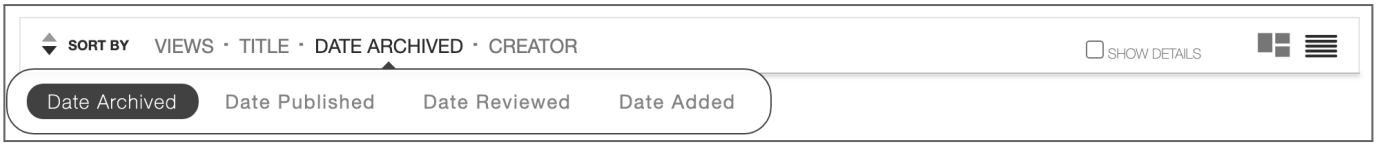

Figure 11.1: Sort by filters

When filtering by Dates in the "Sort By" function, we did not find the ability to filter in dates in ascending order. The filter only allowed us to display collections in descending order (newest to oldest). This violates the flexibility and efficiency of the use heuristic as the user does not have full customization capabilities.

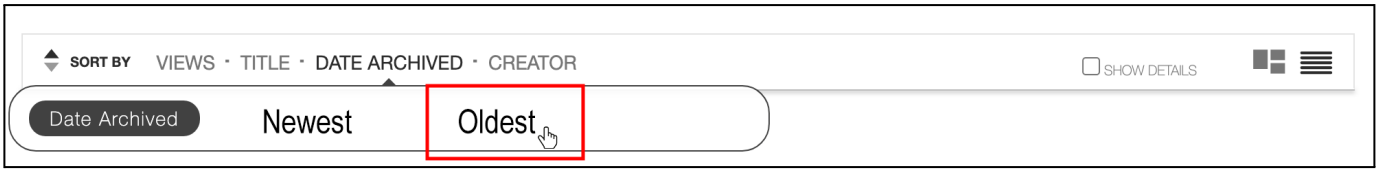

Figure 11.2: Options to filter dates in ascending or descending order

Recommendation:
We recommend giving the users the option to filter dates in both ascending and descending order.

Finding #12:

Issue:	Selected Options are not visible in the tableau
Severity:	3/4
Heuristic Violated:	6 - Recognition rather than recall

Figure 12.1: Sort By filters

When selecting a specific “Sort By” option, it was not easily visible which option was selected. This violates the recognition rather than recall heuristic as users do not easily recognize which option has been selected in that interface.

Figure 12.2: Sort By filters with highlighted selection

Recommendation:
We recommend making the selection more visible by highlighting the parent link or using a text color that provides more contrast from the rest of the options.

Finding #13:

Issue:	Inconsistent modular grid system
Severity:	4/4
Heuristic Violated:	6 - Aesthetic and minimalist design

We found that the modular grid design was an efficient and flexible format for the type of website that the Internet Archive is. It provided a great hierarchy and contained the right chunk of information for each module. However, it violates the Aesthetic and minimalist design heuristic because some items are not aesthetically pleasing. The circle logos or brands in each grid give a very unpleasant look. Additionally, the height of each modular grid is not consistent.

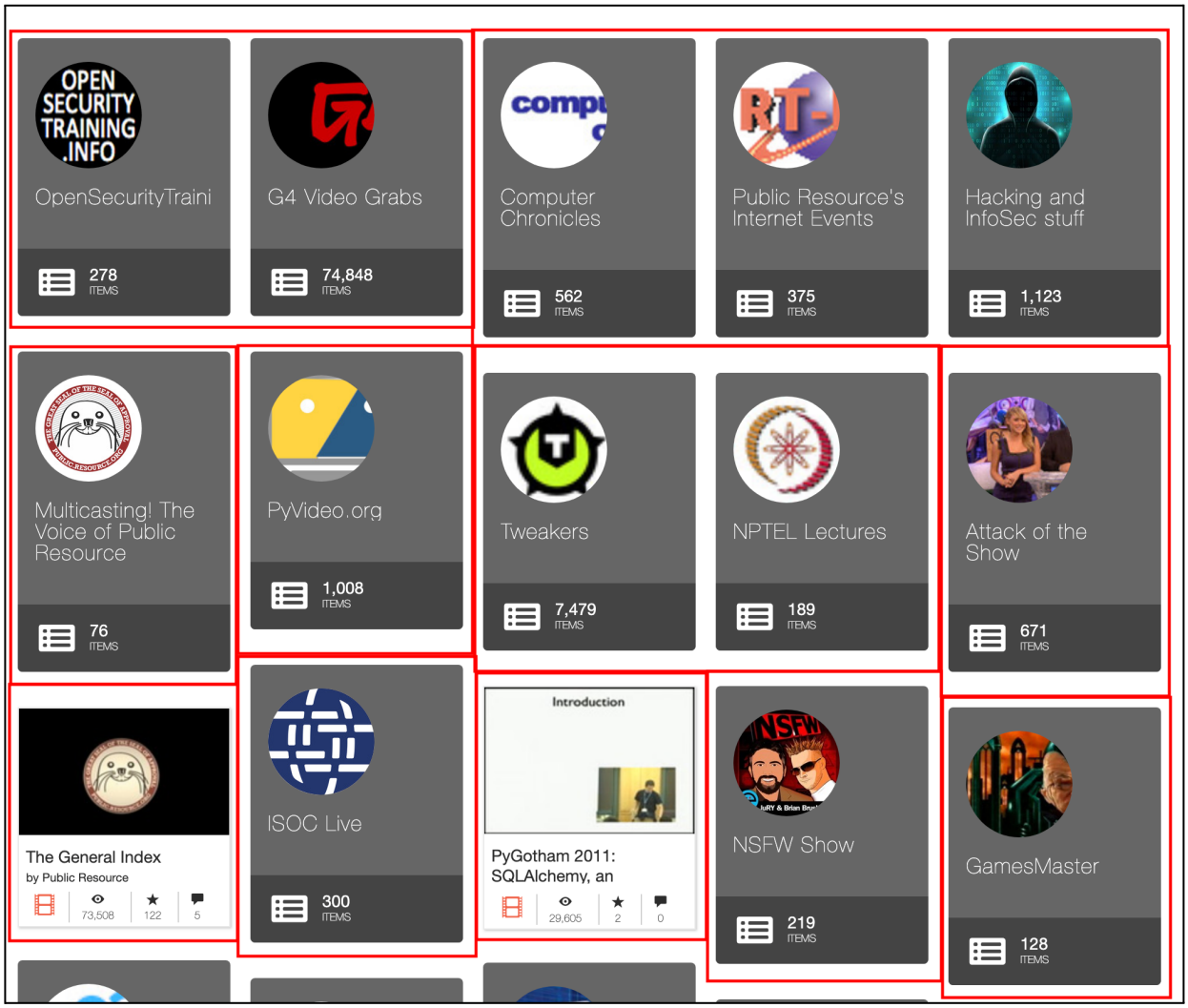

Figure 13.1: Modular grid of collections page

Recommendation:

We highly recommend filling each modular grid with the entire logo or brand, or at least two-thirds, to create a square. Additionally, we recommend that each grid is consistent in size and lined up perfectly.

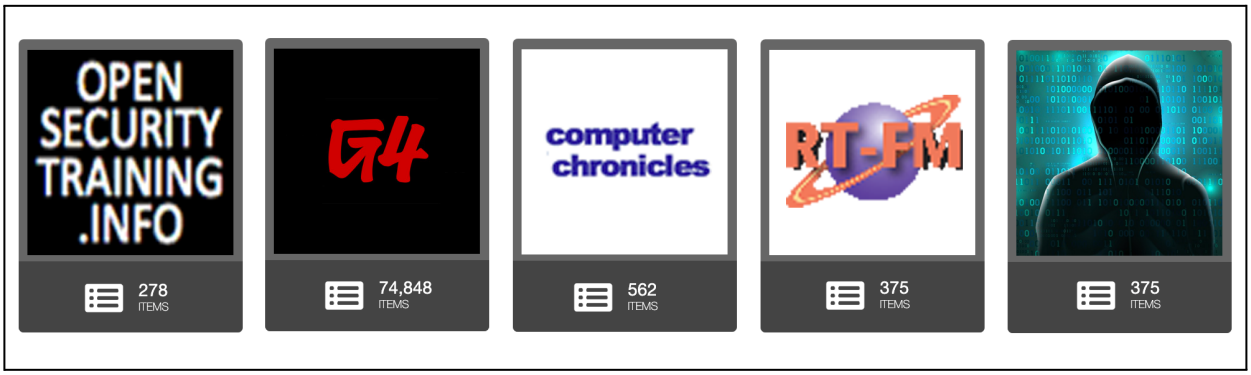

Figure 13.2: Example of the improved modular grid (first row)

DISCUSSION

We found many usability issues that we believe would be useful in improving the webpage's functionality and overall look. The manner in which a user searches and applies filters, or how a user manages their favorites can drastically improve a user's experience. However, our findings may differ in perspective because we were not frequent users of this webpage. More frequent users may have learned to deal with such inefficiencies, thus having differing issues.

We would recommend more heuristic evaluations from a variety of users. From casual internet users to more tech-savvy individuals, a wide range of users evaluating the webpage would provide more beneficial results. Additionally, it would be nice to sit down with the designers of the site to better understand why they built certain things the way they did.

CONCLUSION

We conclude that our heuristic evaluation of the Internet Archive's Computers and Technology, Collection Page, revealed a total of 13 heuristic violations. With action flows consisting of thorough navigation throughout various pages, searching videos, and utilizing options such as "Favorites," we found seven usability problems that we believe are important to fix and should be given high priority. We found a total of five usability catastrophes that we believe are imperative that they are fixed. Most of these violations fell under the aesthetic and minimalist design heuristic and some under the recognition rather than recall heuristic. Other heuristic violations include match system and real-world; help users recognize, diagnose, and recover from errors; visibility of system status; consistency and standards, and flexibility and efficiency of use.

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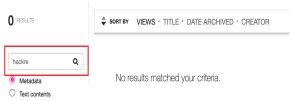
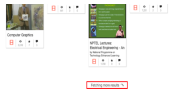
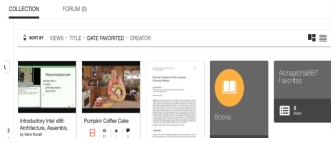
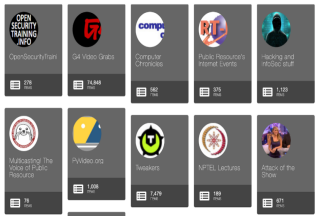
Description	System Location	Heuristics Violated	Severity
There are two search boxes on the webpage—one on the top right and the other on the far-left column. The top right search box searches the entire site, whereas the left searches the video collections. These two search boxes can conflict with each other. Naturally, we were inclined to utilize the top right search box to search the page we were on. Screen shot:	Collection Page	#6 Recognition rather than recall	3
Two confusing options under the search sidebar. The word “Metadata” and “Text contents” are overly technical which might affect the readability of the search function. Due to the diverse demographic background of the end user on this webpage, they might have some difficulty understanding the actual meaning of this option. Screen shot:	Collection Page	#2 Match system and the real world	4
Correcting errors is missing in the search function. We tried to search a wrong keyword "hackre" to see any correction on this search function. Google Search On 2020 had revealed that “one search query in ten contains spelling errors” (SEO & Web marketing suite, 2021) and this represented misspelling is a common mistake made by users. Slip-of-finger errors are also classified as classic print errors, the users know how to spell the terms but type them incorrectly due to distraction. Screen shot: 	Collection Page	#9 Help users recognize, diagnose, and recover from errors	3
When you scroll down on the result page of Internet Archive, it automatically loads the content continuously. However, it may lead to the lost of orient during navigation. It might be hard for users to allocate any specific items. Screenshot: 	Collection Page	#1 Visibility of System Status	3
Lack of file management in My Favourite.The Internet Archive mainly provided an online database that allows them to download the media. It might take a longer time to search for what they are looking for when they have 20+ favorite media. A cluttered layout without visual order might increase the cognitive load of the users. Screen shot: 	My Favorite	#8 Aesthetic and minimalist design	4
Two navigation bars provide too many options for users and these are confusing and overwhelming to users. The user might find it difficult to make choice at the first sight. It violated the rule of aesthetic and minimalist design as the secondary menu is considered visual clutter, which is known as “noise”. Screenshot:	Collection Page	#8 Aesthetic and minimalist design	4

Two search boxes are found inside the horizontal navigation bar.The right search box searches archived and the left helps to save the active webpage. Including the search box in the sidebar, there are three in total. The webpage is overcrowded with options and this might block user from finding the important things during their quick scan. Screenshot:	Collection Page	#8 Aesthetic and minimalist design	4
The rotating logos next to the Computers & Technology title is an unnecessary element that may distract users. This violates the Aesthetic and Minimalist Design heuristic. It gives noise which is irrelevant to information in the interface. Screenshot:	Collection Page	#8 Aesthetic and minimalist design	3
The "More" link sends users to the “About” section. Upon clicking this link, we were expecting the additional text to display, however it sends us to another page which is a bit redundant because the “About” link is located just below it. It violates consistency and standards as well as the aesthetic and minimalist design because it is an unnecessary element that can be distracting. Screenshot:	Collection Page	#4 Consistency and standards	2
Some of the options in the upper right corner labeled Share, Favorite, and Play All, are not clear on what they do. After reviewing each link, they are important functions that should be more prevalent to the user. This violates the recognition rather than recall heuristics as this information should easily be recognizable to the user. Additionally, the “Play All” link does not appear to do anything. Screenshot:	Collection Page	#6 Recognition rather than recall	4
When filtering by Dates in the “Sort By” function, we did not find the ability to filter in dates in ascending order. The filter only allowed us to display collections in descending order (newest to oldest). This violates the flexibility and efficiency of the use heuristic as the user does not have full customization capabilities. Screenshot:	Collection Page	#7 Flexibility and efficiency of use	3
When selecting a specific “Sort By” option, it was not easily visible which option was selected. This violates the recognition rather than recall heuristic as users do not easily recognize which option has been selected in that interface. Screenshot:	Collection Page	#6 Recognition rather than recall	3
We found that the modular grid design was an efficient and flexible format for the type of website that the Internet Archive is. It provided a great hierarchy and contained the right chunk of information for each module. However, it violates the Aesthetic and minimalist design heuristic because there are some items that are not aesthetically pleasing. The circle logos or brands in each grid give a very unpleasant look. Additionally, the height of each modular grid is not consistent. Screenshot: 	Collection Page	#8 Aesthetic and minimalist design	4